

Evaluate

$$1) \log_{27} 3 = x$$

$$27^x = 3$$

$$x = \frac{1}{3}$$

$$2) \log_{25} \left(\frac{1}{5}\right) = x$$

$$25^x = 5$$

$$x = \frac{1}{2}$$

$$25^x = \frac{1}{5}$$

$$x = -\frac{1}{2}$$

## Natural Logarithm

$$\log_e X = \ln(X)$$

$$e = \text{constant} = 2.718$$

## Change of Base Formula

$$\log_c a = \frac{\log_b a}{\log_b c}$$

\* Note : your b is either going to be 10 or e.

$$\log_c a = \frac{\log a}{\log c} \quad \text{or} \quad = \frac{\ln a}{\ln c}$$

Evaluate

$$\log_3 8 = x$$

$$3^x = 8 \quad \text{can't do it like this}$$

$$\log_3 8 = \frac{\log 8}{\log 3} = 1.8927 \quad \checkmark$$

$$= \frac{\log_e 8}{\log_e 3} = \frac{\ln 8}{\ln 3} = 1.8927 \quad \checkmark$$

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skip ln ones....

37.] KH

$$\textcircled{5} \log x - \textcircled{4} \log y$$

$$\log x^5 / y^4$$

38] BB

$$\textcircled{5} \log_4 2 + \textcircled{7} \log_4 x +$$

$$\textcircled{4} \log_4 y =$$

$$\log_4 \underline{2^5 x^7 y^4}$$

23.  $\log_7(5 \cdot x^3 \cdot y \cdot z^2)$

$$\log_7 5 + \log_7 x^{\textcircled{3}} + \log_7 y$$
$$+ \log_7 z^{\textcircled{2}}$$

$$= \log_7 5 + 3\log_7 x + \log_7 y + 2\log_7 z$$

## Solving Equations

$$\log_b y = x$$

$$b^x = y$$

$$4^x = 11$$

switch to log form

$$\log_4 11 = x$$

$$\frac{\log 11}{\log 4} = x = 1.73$$

$$2^x = 5$$

$$\log_2 5 = x$$

$$\frac{\log 5}{\log 2} = 2.322$$



$$\begin{array}{r} -3e^{2x} + 16 = 5 \\ \underline{-16} \quad \underline{-16} \end{array}$$

$$b^x = y$$

$$\begin{array}{r} -3e^{2x} = +11 \\ \underline{-3} \quad \underline{+3} \end{array}$$

$$e^{2x} = \frac{11}{3}$$

$$\log_e\left(\frac{11}{3}\right) = 2x$$

$$\frac{\log \frac{11}{3}}{\log e} = 2x$$

$$\frac{1.29}{2} = \frac{2x}{2}$$

$$\boxed{x = .650}$$

Practice

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$$\begin{array}{l} b^a = c \\ \log_b c = a \end{array}$$